HYDRIC SOIL INDICATORS

Presentation by: USCOE
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Soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part

(Federal Register, July 13, 1994)

Challenge

Often absent during wet period

Need to rely on:

- **indicators in the soil**
- **observation of the overall site**

Indicators

Soil becomes anaerobic

- **odors**
- **redoximorphic features (colors)**
- **organic decomposition slows**

Odor and Colors

Microbes reduce O_2, NO_3-, Fe, Mn, S

- **S leaves a distinctive odor**
- **Fe and Mn leave color markers in soil**

Odor Indicator

Hydrogen Sulfide Odor close to surface

Sulfur is reduced

Color Indicators

Redoximorphic Features

- *Reduced* Fe and Mn - bluish-gray colors or “gley”
- *Oxidized* Fe and Mn - reddish-orange colors or “concentrations”

Reduction - *Gley*

Bluish-gray colors can indicate that iron is reduced

there are exceptions

Reduction - *Gley*

Bluish-gray colors that change on exposure to air indicate that iron is reduced

Oxidation - Conditions

Mix of bluish gray and reddish orange colors, especially in root channels

Fe and Mn is reducing and oxidizing

Organic Soil Indicator

Anaerobic conditions result in slower decomposition rates and rapid accumulation of organic matter

There are exceptions

Saturated Organic

Confusing Indicators

Is the indicator truly representing a wet condition or something else?

Fe “concentrations”

v

s

Fe in a well drained soil

Redoximorphic “concentrations” alone

Seasonal Frost

Soils with Low Iron Content or high pH

Gley Colored Parent Materials

Non-saturated Organic Surfaces

WHY SHOULD THIS SOIL BE
WET?
! THINK
!

Original Work

- Avoid a checklist approach
- Understand the evidence
- Landform, slope shape, parent material, restrictive layers?

Soil
Indicators

Concave
Landforms

Vegetation
Indicators

Impermea
ble
Substratu
ms

Parent Material

Slopes

Indicator Guides

1987 Corps Manual

- **Official indicators used by COE**
- **Some are good**
- **Some are too general**
- **Some do not work in**

Indicator Guides

Field Indicators of Hydric Soils in U.S.

- **Official indicators used by NRCS**
- **Supplemental indicators for COE**
- **Interagency testing in Alaska**
- **Specific but hard to understand**

Indicator Guides

New Indicators for Alaska

- **Compiled by Interagency Specialists**
- **Part of ’87 Manual Regionalization**
- **Recommended to the NTCHS**

Indicator Guides

Field Indicators of Hydric Soils In Alaska

- **User's Manual for new Indicators**
- **Draft (not officially adopted)**
- **Includes indicators and explanatory notes.**

Field Indicators of Hydric Soils In Alaska

Saturated Organic Surfaces

Surface organic soil material within 30 cm of the soil surface that is greater than 20 cm thick and is saturated in all or part of the material.

Saturated Organic Surfaces

> 20 cm of saturated organic

Field Indicators of Hydric Soils In Alaska

Positive Reaction to Ferrous Iron Test

Application of alpha-alpha dipyridyl dye to mineral soil material within 30 cm of the soil surface results in a positive reaction within 30 seconds as evidenced by a pink or red coloration to

Positive Reaction to Ferrous Iron Test

Dye turns red if reduced iron

Field Indicators of Hydric Soils In Alaska

Hydrogen Sulfide Odor

The presence of hydrogen sulfide (rotten egg) odor emitting from some part of the soil within 30 cm of the soil surface.

Field Indicators of Hydric Soils In Alaska

Alaska Gleyed

Dominant hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB; with value of 4 or more in the matrix, within 30 cm of the mineral surface; and underlain by hue of 5Y or redder in the same type of parent material.

Alaska Gleyed

- Distinguishes gleyed colors from parent material colors

Field Indicators of Hydric Soils In Alaska

Alaska Redox Gleyed

A layer that has dominant hue of 5Y with chroma of 3 or less, or hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB; and with 10 percent or more redox concentrations as pore linings with value and chroma of 4 or more. The layer occurs within 30 cm of the soil surface.

Alaska Redox Cleyed

Alaska Redox Gleyed

Field Indicators of Hydric Soils In Alaska

Alaska Thick Dark Surface

A mineral layer at least 15 cm thick with a depleted matrix that has 60 percent or more chroma of 2 or less (or gleyed matrix) starting below 30 cm of the surface. The layers above the depleted or gleyed matrix have hue N or 10YR and value and chroma of 2 or less to a depth of at least 30 cm.

Alaska Thick Dark Surface

Field Indicators of Hydric Soils In Alaska

Alaska Gleyed Pores

Presence of 10 percent hue N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more in the matrix or along channels within 30 cm of the soil surface. The matrix has dominant chroma of 2 or less.

Alaska Gleyed Pores

Field Indicators of Hydric Soils In Alaska

Abrupt Boundary Color *(SE indicator)*

A mineral layer at least 15 cm thick with 60 percent or more hue 2.5Y or yellower starting within 30 cm of the soil surface. The layer above the 2.5Y or yellower layer has hue of 7.5YR or redder. The boundary between the colors is less than 5 cm thick and is

Abrupt Boundary Colors

Field Indicators of Hydric Soils In Alaska

Color Change

A layer 4 inches or more thick starting within 30 cm of the soil surface that has a matrix value of 4 or more and chroma of 2 or less that increases by one or more in hue and/or chroma when exposed to air within 30 minutes.

Color Change

Field Indicators of Hydric Soils In Alaska

Alaska Alpine Swales

A mineral layer at least 10 cm thick with hue of 10YR and value and chroma of 2 or less, occurring in a concave landform position. The dark surface layer is at least twice as thick as a surface mineral layer of the same color on adjacent convex positions.

Alaska Alpine Swales